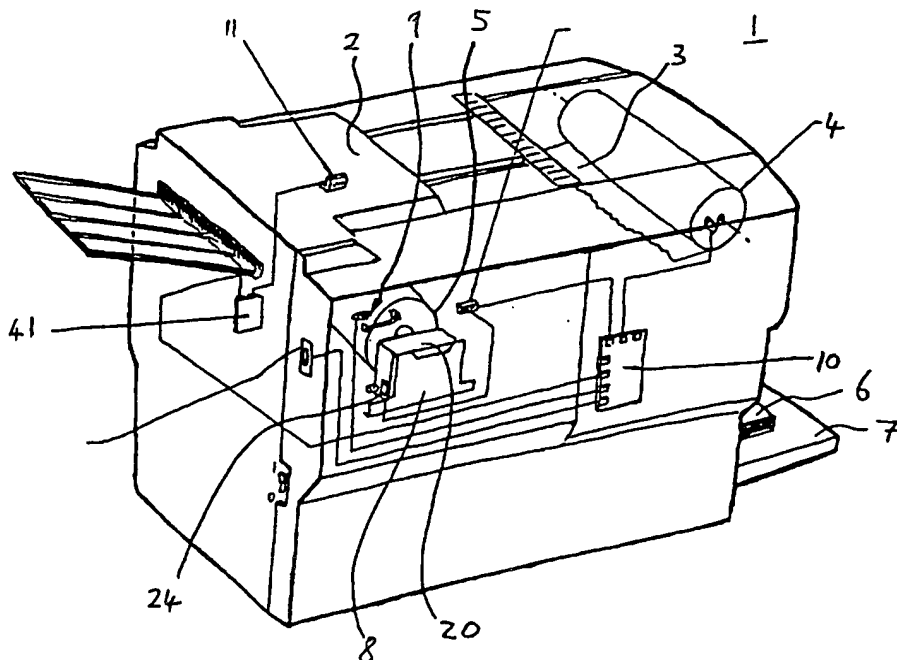




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

| | | |
|---|--|--|
| (51) International Patent Classification ⁶ : B41L 13/06, B65H 26/00 | | (11) International Publication Number: WO 97/21548 |
| A1 | | (43) International Publication Date: 19 June 1997 (19.06.97) |
| (21) International Application Number: PCT/GB96/03025 (22) International Filing Date: 9 December 1996 (09.12.96) (30) Priority Data: 9525167.4 8 December 1995 (08.12.95) GB (71) Applicant (for all designated States except US): GESTETNER MANUFACTURING LIMITED [GB/GB]; 66 Chiltem Street, London W1M 2AP (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): SEBER, Michael, John [GB/GB]; 12 Glenfield Drive, Great Doddington, Northants NN29 7TE (GB). MORGAN, Christopher, John [GB/GB]; 13a Aylesford Way, Stapleford, Cambs. CB2 5DP (GB). FERMOR-DUNMAN, Geoffrey [GB/GB]; 6 The Orchards, Orton Waterville, Peterborough PE2 5LA (GB). (74) Agents: BARLOW, Roy, James et al.; J.A. Kemp & Co., 14 South Square, Gray's Inn, London WC1R 5LX (GB). | | (81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published With international search report. |

(54) Title: CONSUMABLE MATERIAL MANAGEMENT SYSTEM AND METHOD



(57) Abstract

In a device (1) which uses consumable material, an electronic device (24) is attached to the packaging (20) of the consumable which stores information about the consumable, and the quantity remaining in the packaging. The device is thus capable of reading such information and updating it by decrementing a counter of the electronic device (24) and optionally responding accordingly, i.e. if the wrong type of consumable is used.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

| | | | | | |
|----|--------------------------|----|--|----|--------------------------|
| AM | Armenia | GB | United Kingdom | MW | Malawi |
| AT | Austria | GE | Georgia | MX | Mexico |
| AU | Australia | GN | Guinea | NE | Niger |
| BB | Barbados | GR | Greece | NL | Netherlands |
| BE | Belgium | HU | Hungary | NO | Norway |
| BF | Burkina Faso | IE | Ireland | NZ | New Zealand |
| BG | Bulgaria | IT | Italy | PL | Poland |
| BJ | Benin | JP | Japan | PT | Portugal |
| BR | Brazil | KE | Kenya | RO | Romania |
| BY | Belarus | KG | Kyrgyzstan | RU | Russian Federation |
| CA | Canada | KP | Democratic People's Republic of Korea | SD | Sudan |
| CF | Central African Republic | KR | Republic of Korea | SE | Sweden |
| CG | Congo | KZ | Kazakhstan | SG | Singapore |
| CH | Switzerland | LI | Liechtenstein | SI | Slovenia |
| CI | Côte d'Ivoire | LK | Sri Lanka | SK | Slovakia |
| CM | Cameroon | LR | Liberia | SN | Senegal |
| CN | China | LT | Lithuania | SZ | Swaziland |
| CS | Czechoslovakia | LU | Luxembourg | TD | Chad |
| CZ | Czech Republic | LV | Latvia | TG | Togo |
| DE | Germany | MC | Monaco | TJ | Tajikistan |
| DK | Denmark | MD | Republic of Moldova | TT | Trinidad and Tobago |
| EE | Estonia | MG | Madagascar | UA | Ukraine |
| ES | Spain | ML | Mali | UG | Uganda |
| FI | Finland | MN | Mongolia | US | United States of America |
| FR | France | MR | Mauritania | UZ | Uzbekistan |
| GA | Gabon | | | VN | Viet Nam |

- 1 -

CONSUMABLE MATERIAL MANAGEMENT SYSTEM AND METHOD

This invention relates to the application of electronic data storage means to packaging for a consumable material. In particular it provides a method and apparatus
5 for processing a consumable material, a packaging for consumable material for use therein, and a kit of parts for apparatus to convert it to embody this invention.

Many devices utilise materials which are consumable and must be replaced when the supply runs out. In many instances, the quality, type, colour, size etc of the material must not be changed inadvertently, in that in some cases the type of
10 consumable can be changed if the device is adapted accordingly. If this specification of the material is allowed to change such as by using the wrong type of material, the device which is utilising it may be damaged or the end product produced by the device may be defective. The onus is therefore on the user to ensure that the new material meets the appropriate specification. A further problem is the availability of
15 inferior quality substitutes for consumable material. Such material may be represented as a suitable replacement for a particular consumable, but may be of an inferior quality to that specified by the manufacturer of the device on which it is to be used.

A further problem with the supply of consumable material is that the packaging, in which the material is supplied, often hides the quantity of material
20 which remains. Also, when the material has been inserted into the device in which it is to be used it may be difficult to gain access to monitor the amount of material remaining. Therefore, the user may be unaware that the material is running low until the device begins to malfunction because the consumable material is exhausted.

Various prior attempts have been made to monitor the matching of
25 consumables with a machine on which they are to be used. For example, GB-A-2216437 discloses a toner cartridge having means for indicating the type of toner stored therein, and this can be used to prevent the mixing, with the residual toner already in the consuming machine, of a different kind of toner from a fresh cassette. The monitoring is effected by various possible means such as reflecting pads, a
30 magnetic material, or an electrical resistance, indicative of the type of toner in the packaging. GB-A-2257093 discloses a laser printer on which the toner cartridge has

- 2 -

a memory which can be read by the printer, so that unless the appropriate cartridge is inserted in the cartridge-receiving slot the laser cannot be activated. This prevents the possibility of an engineer, carrying out maintenance work, being damaged by exposure to the laser emission when either no cartridge is present in the toner
5 cartridge slot or the presence of an incorrect cartridge in the slot may allow leakage of the laser emission to the exterior.

It is also known to monitor the presence of consumables, for example in EP-A-0653307 where a sensor monitors if a sheet of paper has been supplied and will stop a printer if no sheet is detected, and in US-A-4141646 where a light emitter and
10 detector are present to sense the concentration of developing liquid in the storage reservoir. However, these systems monitoring the consumable are simply there to detect current operating parameters regarding consumables rather than indicating the expected further useful life of the consumable supply.

It is an aim of the present invention to overcome these problems by
15 providing a means of packaging consumable material to provide information about the status of the material in the packaging.

Therefore, according to one aspect of the present invention there is provided a processing apparatus and a consumable material which is utilised therein, comprising:

- 20 utilisation means for using said consumable material;
- control means for controlling operation of said apparatus; and
- holder means for the packaging containing said consumable material, said holder means being provided with electrical contacts connected to said control means, wherein said holder contacts are connectable to corresponding contacts on
25 said packaging, wherein said packaging contacts are connected to an electronic memory means in said packaging for providing data indicative of the status of the consumable material, wherein said control means is operative to interrupt normal operation of said utilisation means in the absence of expected status data, and wherein said electronic memory means includes a counter to be decremented by the control
30 means as the utilisation means uses the consumable. For example, in the case of a stencil duplicator, where the consumable material is stencil master, the master feed

- 3 -

means may be interrupted or the mode of operation (i.e. photo quality or text quality which differ in that photo-quality includes pixel dropping giving reduced image quality) may be restricted to one particular mode.

5 The status data may be the quantity remaining and may be updated by the control system as the consumable material is used to provide a record in the electronic means of the amount of consumable remaining in the packaging. The apparatus therefore preferably comprises monitoring means for providing information about the amount of material being used to allow the control system to update the status data provided by said electronic means in the packaging.

10 In the event that the apparatus is operating but the monitoring means does not detect the usage of consumable material, then the control means will preferably interrupt normal operation of the apparatus. For example, again referring to a stencil duplicator, it may be possible for the user to deliberately disable the monitoring means in an attempt to overcome the features of the system. Thus if the system
15 expects ink to be used and thus the pump to pump, and such pumping is not detected within a certain number of copies for example, the pump can be disabled.

The present invention is particularly suited for use in copying and printing devices such as stencil duplicators where both ink and stencil master material are used-up during the printing process. In this case, the utilisation means may include (i) ink
20 pumping means for pumping the ink from the packaging means, or (ii) a stencil master feed means controlling the supply of stencil masters. In this way, the control means can interrupt normal operation of the duplicator by inhibiting the ink pumping means or the stencil master feed means. Where provided on the duplicator, it may be advantageous to restrict the user's choice of printing modes e.g. to photo mode
25 printing only.

A second aspect of the invention provides a package for consumable material including the consumable material, and electronic memory means including a decrement only counter to be actuated for decrementing to a different value, wherein said package includes connection means for connecting said electronic memory means
30 to an apparatus according to the first aspect of the present invention, for decrementing of the counter by the apparatus.

- 4 -

A third aspect of the invention provides the kit of parts defined in claim 14.
Yet a further aspect of the invention provides the kit of parts defined in claim 15.

A fifth aspect of the invention provides a method as defined in claim 16.

5 In order that the present invention may more readily be understood, the following description is given, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is a partially cut away view of a stencil duplicator according to the present embodiment;

10 Figures 2a to 2d show an ink supply box for use with the apparatus according to the present invention;

Figure 3 is a schematic diagram of the duplicator system;

Figure 4 shows a detailed schematic diagram of the control system for the present invention;

15 Figures 5A and 5B show a reel of master;

Figure 6 shows a view of the ink box positioned in the holder which is in the loading position; and

20 Figure 7 shows the stencil master and the receiver for the connector to the electronic means.

Figure 1 shows a "copy printer" comprising a stencil duplicator 1 according to an embodiment of the present invention. An original to be copied is fed through a scanning device 2 on the top of the duplicator. A stencil master is produced by the unwinding of an appropriate section of master material 3 from a master reel 4, past 25 a cutting head for producing holes in the polyester film layer of the stencil master corresponding to the image on the original. The advancing stencil master is then rolled around a printing drum 5 in readiness for printing. Once printing begins, paper 6 is fed from a paper feed tray 7 into the machine and then passed by the printing drum 5. Ink for the printing process is provided in a "wine box" type 30 packaging 20 (see Figure 2). The ink supply packaging 20 includes a housing 21, a bag 22 for housing the ink, and a nozzle arrangement 23 for extracting the ink.

- 5 -

Referring again to Figure 1, an ink pump pumps the ink from the ink supply 20, to the drum 5 which has a porous outer surface. The ink is driven through the porous outer surface of the drum and through the holes cut in the stencil to form an image on the paper 6 pressed against the rotating drum surface.

5 When the ink supply is exhausted, the entire ink container 20 is removed from the printer and replaced with a similar ink package. In order to avoid variations in the quality of the printing produced, or indeed damaging the duplicator itself, it is important to ensure that the replacement ink is of a similar kind to that which it is replacing. For example if a different coloured ink was accidentally inserted, it may
10 take several hundred copies before the old ink is flushed through the system consequently wasting large amounts of ink and paper. Also if the wrong type of ink is used, then it may be necessary to replace the drum or have the drum cleaned, again, resulting in waste of ink and potentially the expense of having to replace or clean the drum.

15 With the kind of packaging used with the machine, it is difficult to ascertain how much ink remains inside the packaging. Therefore the user will only know that the ink has run out when the ink container is empty and either the detector shuts down the machine when the ink quantity in the drum fails to recover in response to an ink demand signal, or in a more simple machine the printing continues but print
20 quality is seriously degraded. This can be particularly important when the duplicator is being used to print documents in different colours on a regular basis, requiring the ink container 20 and the drum 5 to be removed and exchanged between each colour printing, such that the user may come to start printing and only then discover that the ink container 20 is empty.

25 The stencil masters used in duplicators are only usable once and are therefore eventually used up by the machine. Again, it is difficult to judge accurately the amount of master remaining on a reel. It is only when the last master is removed that the user will know that the reel of master must be changed. Furthermore the reel of masters is contained within the body of the duplicator and is not visible unless the
30 user opens the covers of the machine to check. It is also important to ensure that the correct type of master is used for a given application.

- 6 -

In order to overcome these problems the present invention utilises electronic devices similar to those currently used on "smart cards". These devices, referred to herein as "smart chips" (such as the Siemens SLE4406 and the Philips PCF 7960) can be used to store data on them relating to the package to which they are attached. In this case the various details regarding the specification of the ink or stencil master can be recorded, such as colour, type, quality, quantity, "use by" date, etc., to be read by the duplicator when the packaging (4,20) is inserted into the duplicator. Thus if the duplicator detects that the wrong coloured ink or wrong type of master material has been inserted, it can sound an audible alarm to warn the user. Further the device can also be used to provide a counter which can be decremented in use, to act as a "fuel gauge" indicating the amount of remaining ink in the ink packaging 20 or master 3 on the master roll 4.

For ease of use, it is desirable to provide these smart chips on the packaging such that when the packaging is inserted into the duplicator in the usual manner, the smart chip is simultaneously connected to the controller in the duplicator. This avoids the need for the user to separately connect the smart chip to the controller, simplifying their use and avoiding problems should the user forget to connect up the smart chip. The method of mounting the smart chip on the packaging will vary depending on the manner of the packaging itself.

In the case of the ink packaging 20, one of the smart chips is mounted on a flange 25 (Figs 2A to 2D) which extends from the nozzle 23 of the ink container 20. The smart chip 24 is attached to a substrate such as a PCB 27 or the like which is provided with edge connectors 26 mounted on the edge of the flange for connecting to the duplicator when the ink container 20 is in position on the duplicator (see Figure 6). The ink container 20 is held in a holder 8 in the duplicator which accurately locates the ink container in a fixed position by sliding leftwardly to connect the nozzle 23 to an ink pump inlet as the holder 8 is closed. As the ink container is inserted into the holder 8, the edge connectors 26 engage in a connector 60 provided in the holder 8 connecting the duplicator to the smart chip 24 device on the container. The duplicator can then read the appropriate data from the smart chip and also decrement the fuel gauge counter in the chip of the ink container as the ink

- 7 -

is used.

As shown in Figs 5A, 5B and 7, the reel of master 4 is provided with substantially circular engaging lugs 51 on the end caps 52, on the end of each roll. Each of these lugs is pushed into a receiving portion 53 in the duplicator. One of the lugs 51 is provided with an extension 54, to the end of which is attached a smart chip 50, again mounted on a substrate such as a PCB 55. As the master reel 4 is inserted into the duplicator, the lugs 51 engage the receiving portions 53 and the PCB substrate is simultaneously guided into a socket 70 (see Figure 7). The PCB is provided with edge connectors 56 which engage with corresponding connectors in the socket 70.

10 The duplicator can then read the data from the smart chip 50 and correspondingly decrement the counter of the stencil roll chip as the stencil master is used up.

Clearly these methods of mounting the smart chips are not intended as the only construction. The primary requirements are that the smart chip remains firmly attached to the packaging and the packaging has the contacts connected to the smart chip, positioned and arranged, so that they positively engage the corresponding contacts on the duplicator (or other utilisation means). One alternative would be to form the nozzle such that the chip is retained in the wall and perhaps with contacts on the neck of the nozzle.

The duplicator is provided with an ink pump monitoring means 9 which gives an indication of the rate at which ink is being pumped out of the container and into the drum 5. This information is passed to a control board 10, in this case provided in the conventional duplicator.

Figure 3 shows a schematic overview of the duplicator apparatus according to the present invention. This shows a duplicator 1 having a control system which receives information from the smart chips on the consumable used in the duplicator. Figure 3 shows connections to the ink packaging 20 and the stencil master carrier 4. The control system reads data therefrom and if the data is inappropriate, for example the ink cartridge is empty or the wrong type of master has been inserted, the control system switches the duplicator into a protected mode whereby an alarm such as a warning tone may be provided to the user via the user control, the ink pump may be prevented from working or alternatively the duplicator may be prevented from

- 8 -

operating at all.

Figure 4 shows a more detailed schematic diagram of the operational control system used in a duplicator according to the present invention. The control system includes interfaces 40 allowing data to be transferred between the control means and the smart chip on the ink packaging and stencil master roll. Whenever a new ink cartridge or stencil master roll is inserted into the duplicator, the data already stored in the smart chip is read into the control device via the interfaces 40. The data retrieved is then compared with the current system status to ensure that the ink or master is compatible and that the fuel gauge does not read zero, i.e. there is ink or master remaining.

The inking drum 5 is in this case provided with identification means to identify its type and the colour of ink for which is to be used. This identification means may be in the form of a simple electrical contact pad or may also include a smart chip device. The controller 10 checks that the size and design of the drum corresponds to the stencil master that is inserted and also that the colour and type of ink is appropriate to the colour and type allocated to the drum.

Once the controller has completed these checks of the consumable, then the user can start using the duplicator. During operation of the duplicator, ink in the drum is used up as it is passed through the porous outer wall onto the paper. Ink is pumped from the ink supply into the drum by an ink pump. The ink detection PCB 41 monitors the amount of ink in the drum using a level detector, connected via a connector 11, and when it falls below a predetermined level sends a signal to the control means. The control means then outputs a signal to the ink pump to initiate pumping. The ink pump which in this example is a reciprocating cylinder type, pumps ink from the ink container into the inking drum 5. Each cycle of the pump is monitored by an ink pump stroke detector 9 which provides signals which are again fed back to the control means by a interface 42. The control unit then decrements the counter in the smart chip 24 on the ink container.

The control means also monitors the operation of the duplicator to check if the ink pump is activated but no such pump action is being detected by the ink pump stroke detector 9. This may occur if the pump has failed or if the detector is jammed

- 9 -

in one position. Under these circumstances, the duplicator switches to a protected mode as described below.

Similarly each time a new master is produced by the duplicator, the control means 10 decrements the counter in the master smart chip 50.

5 This provides a record of the amount of ink remaining in the container or master on the master reel even if the duplicator is turned off or the consumable in question is removed from the machine.

The control panel also provides additional protection in that if the duplicator detects that the end of a master roll is reached or that an ink detector in the drum
10 continues to indicate a low ink state despite the ink pump being operated, then the respective counter in the master smart chip and in the ink container smart chip is set to zero indicative of the exhausted state.

Once one of the smart chips indicates that the consumable it relates to has reached the zero level, or if the smart chip provides inappropriate or no data (eg. blue
15 ink instead of black ink, an A3 master instead of A4 master) then the control means switches the duplicator into operating in protected mode. In this protected mode, the duplicator may do one of a number of things:-

It may be desirable to prevent operation of the duplicator at all.

Alternatively, the duplicator could be allowed to continue but with limited
20 function. For example, if an incorrect ink cartridge is inserted, it may still be possible to operate the duplicator using the ink remaining in the drum. However, to prevent the newly inserted but incorrect ink being mixed with the residual ink remaining in the drum, the ink pump is inhibited. This will allow the duplicator to operate normally briefly until the residual ink in the drum is depleted. This allows the user
25 to continue to operate the duplicator even though the correct ink cartridge may not be immediately available.

Duplicators of this kind often have a choice of duplication modes. For example a text mode may be provided for copying text and solid line images, and a photo mode may be provided for duplicating images which have half tone quality
30 shading. In the photo mode pixels are dropped by the scanning means 2 to reduce the number of holes produced on the stencil master. This limits the amount of ink

- 10 -

transferred to the paper and provides improved contrast for the reproduction of shaded images. The choice of these two modes is usually selected by the user but in the protected mode, it may be desirable to force the duplicator to work in photo mode. This will produce only masters of the photo quality. This has two effects:
5 firstly the amount of ink used to produce a print is much less than in the text quality mode; and secondly, the quality of images is slightly poorer than when producing text.

Controller 10 is also provided with an interface which can be connected to an external PC or to a display incorporated on the user panel to provide a visual
10 indication of the amount of consumable material remaining and also information about the status of the machine. For example the amount(s) of remaining consumable (ink, master) could be provided, the status of the consumable e.g. type, quality, size, and whether or not the consumable is appropriate for operation of the device i.e. whether or not the device will switch to protected mode in the event of
15 an attempt to use those consumables.

Although this interface is connected to a PC, a single PC can be used to control a number of duplicating machines. This allows an operator to monitor the status of several machines simultaneously thus providing easier control of complex duplicating operations and allowing the user to be rapidly alerted to the occurrence
20 of a problem with any of the machines such as the ink supply being exhausted.

This not only allows a plurality of different duplicating machines to be controlled by the single PC in order to enable that PC to display the remaining consumable (for example ink and stencil material) of the set of machines, but also facilitates management of the printing supplies in a print room.

25 For example, if the electronic memory means of the packaging of the consumable (the ink box or the stencil master roll) is also able to record an identification of the consumable in question (for example the serial number of a particular ink box or a particular stencil master roll) then as each newly acquired package of consumable material is booked into the plant it can be identified and its
30 current status level (presumably full) can be recorded on the stock controlling computer. From then on whenever that particular consumable package is inserted or

- 11 -

re-inserted in a duplicating machine the decrementing of the counter in the electronic means of that packaging will not only (i) result in the packaging next time giving rise to a correct "current status" value detected by the duplicator or other utilisation means involved, but will also (ii) be capable of being stored on the computerised control system so that not only those consumable packages which are currently in use, but also those which are in store, may be monitored. This is particularly advantageous in the case of stencil duplicators where a single ink colour is run at any one time on a particular duplicator and there will therefore naturally be spare ink containers on the premises ready for insertion when later that colour is to be printed. In a single print room the "alternative colour" ink cartridge may be stored centrally rather than alongside each particular duplicator (to ensure better stock consumption and rotation). Hence the controlling computer will have a record of not only the ink contents of the cartridge actually in each duplicator but also the contents of all spare ink containers, together with a record of the colour in question, so that an adequate but not excessive reserve of each particular colour can be maintained and can be monitored on the computer.

More ambitiously, it is possible to arrange for remote location of the or another PC so that the supplier of the ink, stencil material or other consumable can be able to update his records regarding the reserve of consumable materials at his customers' plants and can automatically re-supply in time to avoid total depletion of any particular type of consumable at a particular plant.

In this ideal situation the electronic memory means on the package will therefore record the following data:

- (a) the type of consumable (e.g. ink or stencil material);
- (b) the unique identity (serial number) of that package;
- (c) the remaining count on the decrementing counter means of the electronic memory means; and
- (d) the particular nature of the consumable (the type of stencil material or the colour of ink).

In practice the unique identity serial number and the particular type of consumable material may be interrelated, so that the serial number of the unique

- 12 -

identity of the ink container or stencil material roll will automatically indicate the particular type of ink (colour) or stencil material in question.

Also, in the case of a stencil duplicator the ink screen or duplicator drum may have its own coding means so that exchange of one ink colour to another
5 without exchanging the ink screen or drum for one using the respective colour will give rise to at least an alarm and preferably also a disable signal to prevent operation of the duplicator which would result in pollution of the inks.

Although this embodiment relates to a stencil duplicator, clearly this method of storing information on the packaging of a consumable can be utilised in any
10 number of applications. It is therefore intended that this invention not be limited to stencil duplicators, but may be used in a wide range of other machine types. One such type in the electrostatic photocopier.

This system may also be fitted to an existing copy printer in the form of a retro-fit kit. The kit would include a control board to interface with the existing
15 controller and to provide the new functions, a modified ink level detector PCB, modified holder mounting for the ink package, modifier receiving portion for holding the master reel, pump monitoring means, optional serial interface connection means and appropriate electrical interconnections. The kit may optionally include a modified drum including a drum identification means and an interface and detector
20 for attachment to the duplicator for reading and interpreting the drum identification means and providing such data to the control PCB. The purpose of such identification has been explained above.

- 13 -

CLAIMS

1. A processing apparatus and a consumable material which is utilised therein, comprising:
 - 5 utilisation means for using said consumable material;
 - control means for controlling operation of said apparatus; and
 - holder means for the packaging containing said consumable material, said holder means being provided with electrical contacts connected to said control means, wherein said holder contacts are connectable to corresponding contacts on
 - 10 said packaging, wherein said packaging contacts are connected to an electronic memory means in said packaging for providing data indicative of the status of the consumable material, wherein said control means is operative to interrupt normal operation of said utilisation means in the absence of expected status data, and wherein said electronic memory means includes a counter to be decremented by the control
 - 15 means as the utilisation means uses the consumable.
2. An apparatus according to claim 1 wherein the control system is also operable to interrupt normal operation if the apparatus is in operation and consumable material is being used but such usage is not being detected by said monitoring means.
- 20 3. An apparatus according to claim 1, wherein the control means is a personal computer.
4. An apparatus according to claim 3, including several said utilisation means connected to a single personal computer as common control means.
5. An apparatus according to claim 2, wherein the utilisation means is
- 25 a stencil duplicator having ink pumping means able to be disabled by the control means to interrupt normal operation.
6. An apparatus according to claim 4, wherein the utilization means is a stencil duplicator having two or more reproduction quality modes, and wherein said control means switches the reproduction quality to a minimum level after said
- 30 interruption of normal operation.
7. An apparatus according to claim 6, wherein the consumable material

- 14 -

is a supply of stencil masters and wherein the utilisation means includes a stencil master feed means.

8. A package for consumable material including the consumable material, and electronic memory means including a decrement only counter to be
5 actuated for decrementing to a different value,

said package including connection means for connecting said electronic memory means to an apparatus according to claim 1, for decrementing of the counter by the apparatus.

9. An apparatus according to claim 8, wherein said electronic means
10 includes a non-volatile memory.

10. Apparatus according to any of the preceding claims wherein said electronic means is a smart chip as herein defined.

11. An apparatus according to any one of claims 1 to 10, wherein the status data includes information about the quantity of consumable material in the
15 packaging.

12. An apparatus according to any one of claims 1 to 10, wherein the status data includes a serial number.

13. An apparatus according to any one of claims 1 to 10, wherein the status data includes material data relating to the consumable material in the packaging,
20 including at least one of type, batch, quality, manufacturer, date of manufacture, shelf life and colour.

14. A kit of parts for connection to a stencil duplicator which uses a consumable ink supply and comprises:

inking means for using said ink;
25 control means for controlling operation of said duplicator; and
holder means for packaging containing the ink;
wherein the kit includes:

electrical contacts for attachment to said holder means, such that said electrical contacts are connectable to corresponding contacts on said ink packaging,
30 said packaging contacts being connected to an electronic memory means in said packaging for providing data indicative of the status of the consumable ink in said packaging;

- 15 -

control unit modification means for modifying the control means for providing to said holder means contacts a decrement signal to decrement a counter in response to operation of said inking means; and

connecting means for connecting the modified control means to said electrical
5 contacts;

wherein said modified control means is operative to interrupt normal operation of the duplicator in the absence of expected status data from said holder means contacts.

15 15. A kit of parts for connection to a stencil duplicator which uses consumable stencil master material and comprises:

master feed means for feeding said master material from packaging containing the master material;

control means for controlling operation of said duplicator; and

holder means for the packaging of the master material;

15 wherein the kit includes:

electrical contacts for attachment to said holder means, such that said electrical contacts are connectable to corresponding contacts on said master material packaging, said packaging contacts being connected to an electronic means in said master material packaging for providing data indicative of the status of the consumable
20 master material;

control unit modification means for modifying the control means for providing to said holder means contacts a decrement signal to decrement a counter in response to operation of said master feed means; and

connecting means for connecting the modified control means to said electrical
25 contacts;

wherein said modified control means is operative to interrupt normal operation of the duplicator in the absence of expected status data from said holder means contacts.

30 16. A method of operating utilisation means using consumable material, wherein the consumable material has packaging which includes electronic memory means having a decrement only counter to be decremented by the utilisation means,

- 16 -

comprising mounting a said consumable material packaging on a said utilisation means, interrogating said packaging to detect status information of the consumable material associated with said mounted packaging, during operation of said utilisation means updating the said status information by decrementing the counter of said
5 electronic means in response to operation of the utilisation means, monitoring the updated status information of said consumable material to determine when the supply of consumable material associated with said packaging is depleted, and exchanging said packaging for fresh packaging having a said electronic memory means to be interrogated for determining the current status information regarding the consumable
10 material associated with said fresh packaging.

17. A method according to claim 16, wherein said first and fresh packagings are associated with different types of consumable material and wherein the replacement of the first-mentioned said packaging by said fresh packaging occurs before complete depletion of the consumable material of said first-mentioned
15 packaging, and including the further step of re-mounting the first-mentioned packaging when a further change of type of consumable material is required, with the updated status information of the consumable materials in the first-mentioned packaging again detected by the utilisation means.

18. A processing apparatus substantially as hereinbefore described with
20 reference to an as illustrated in the accompanying drawings.

19. A method of controlling the operation of at least one stencil duplicator, substantially as hereinbefore described with reference to the accompanying drawings.

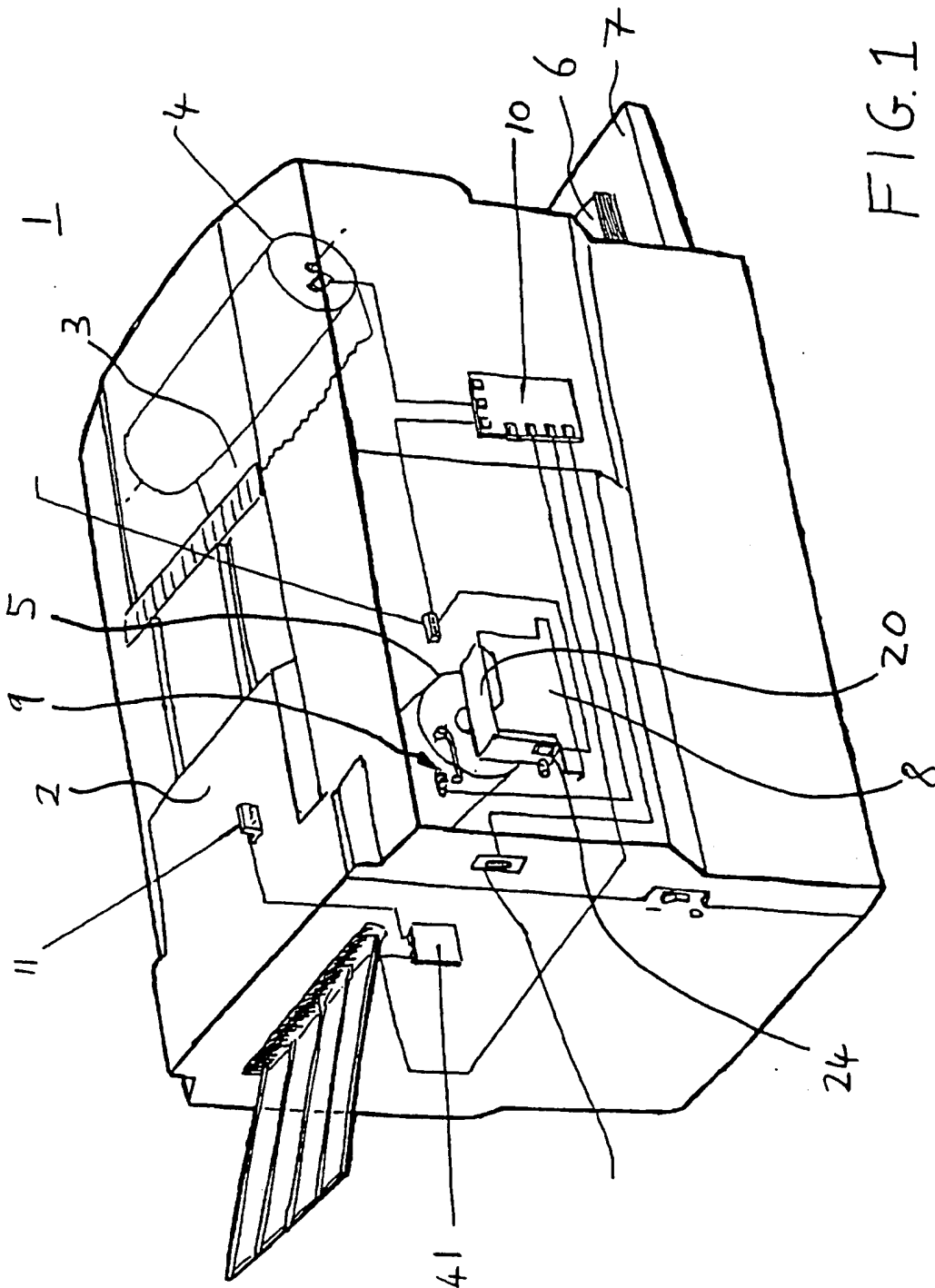
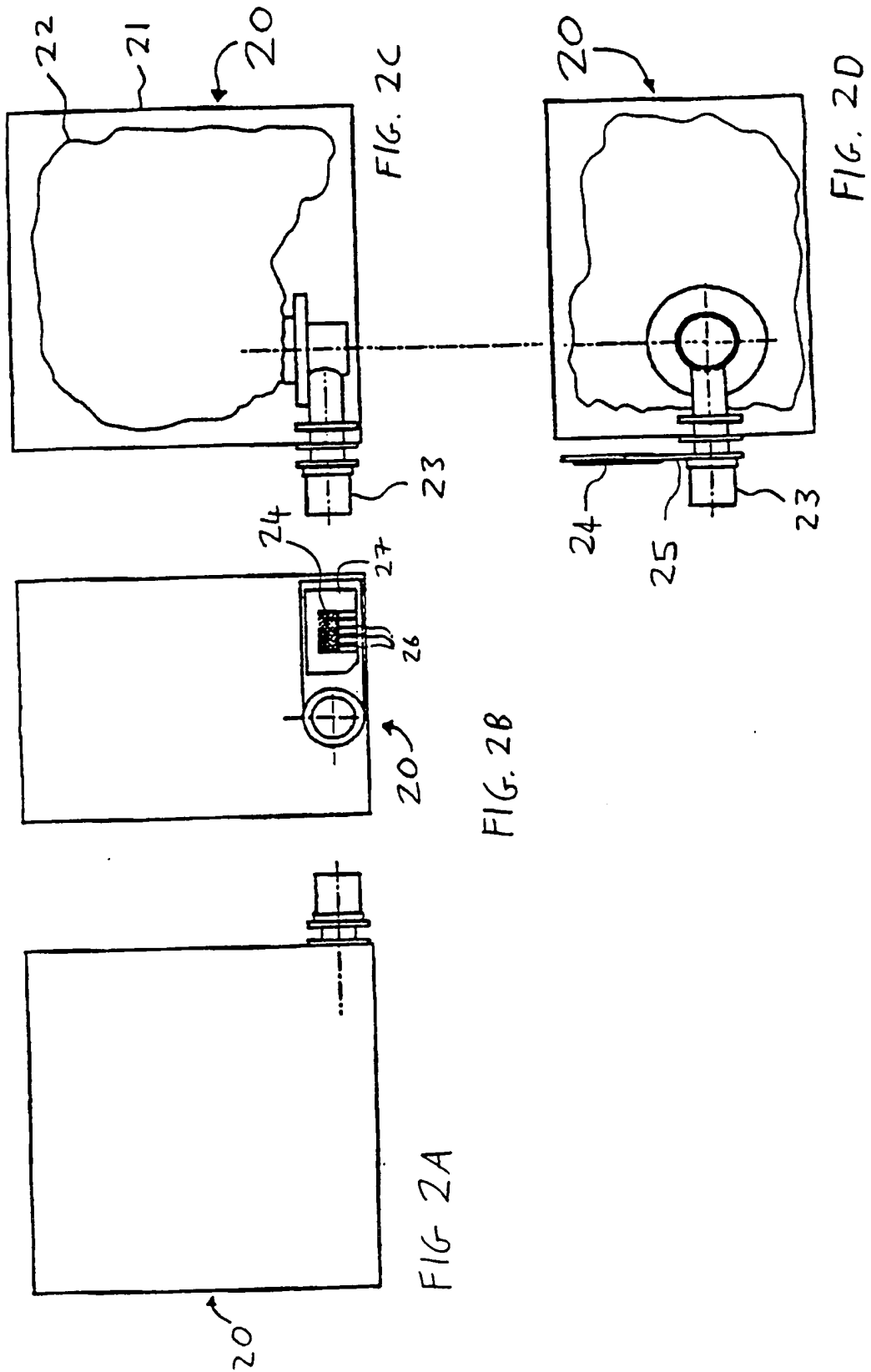


FIG. 1



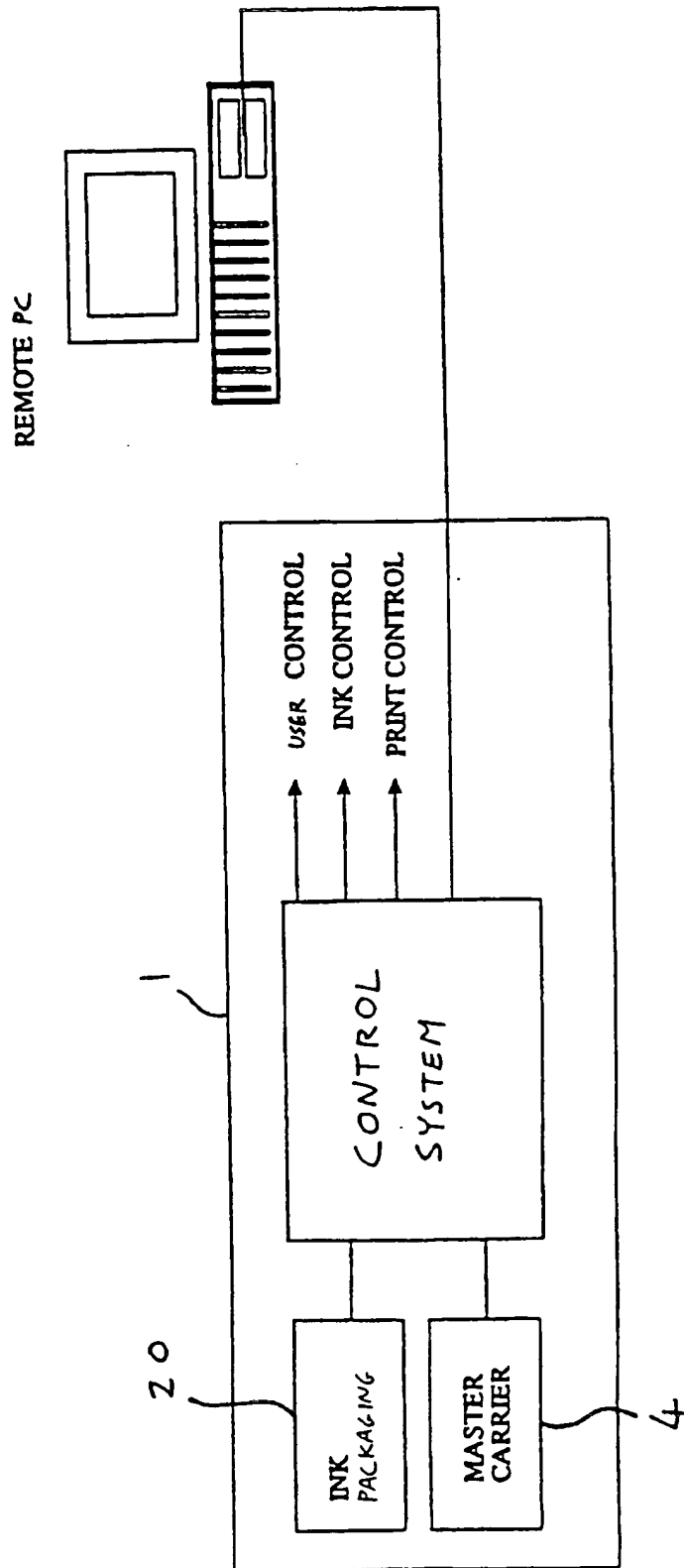


FIG. 3

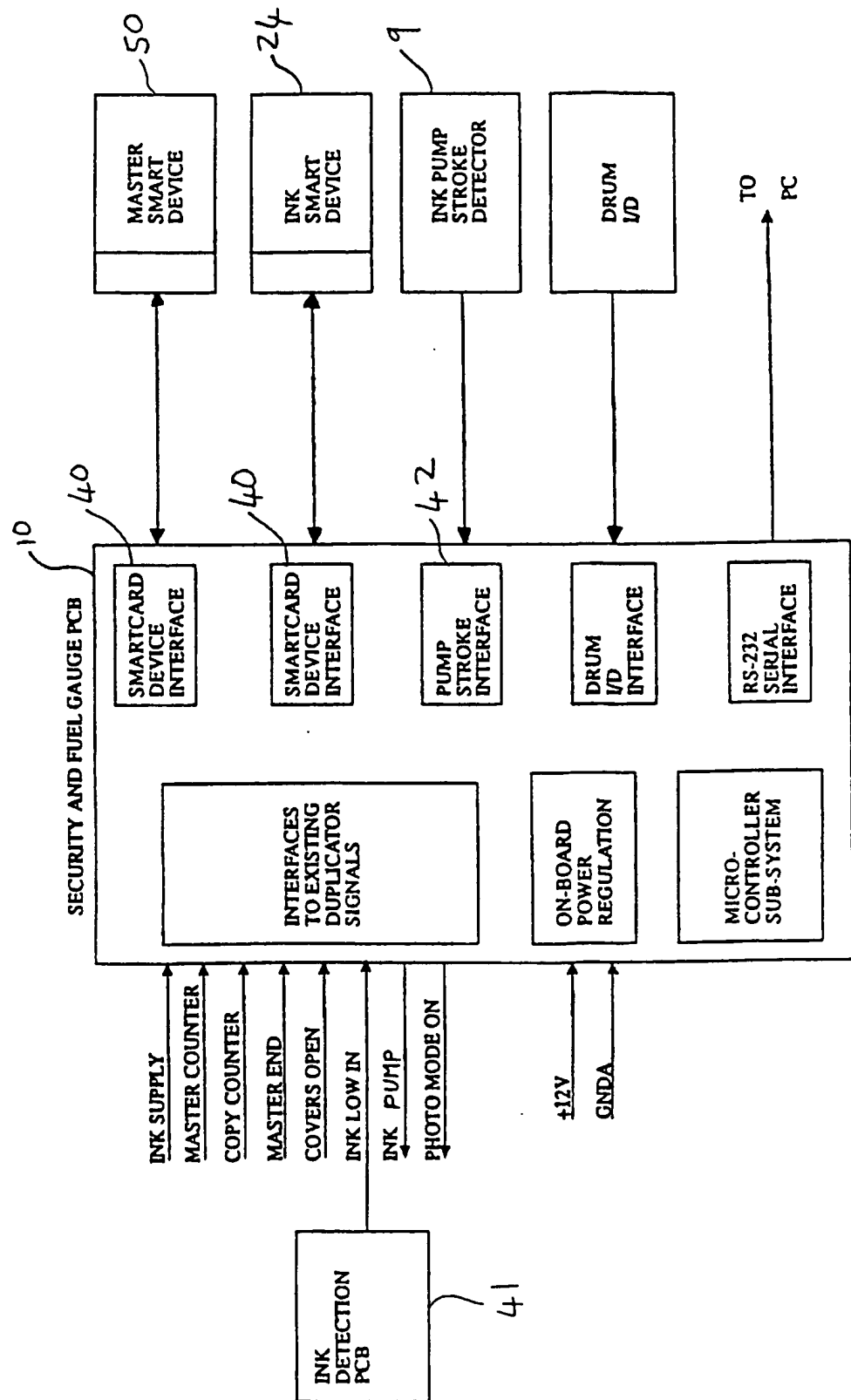
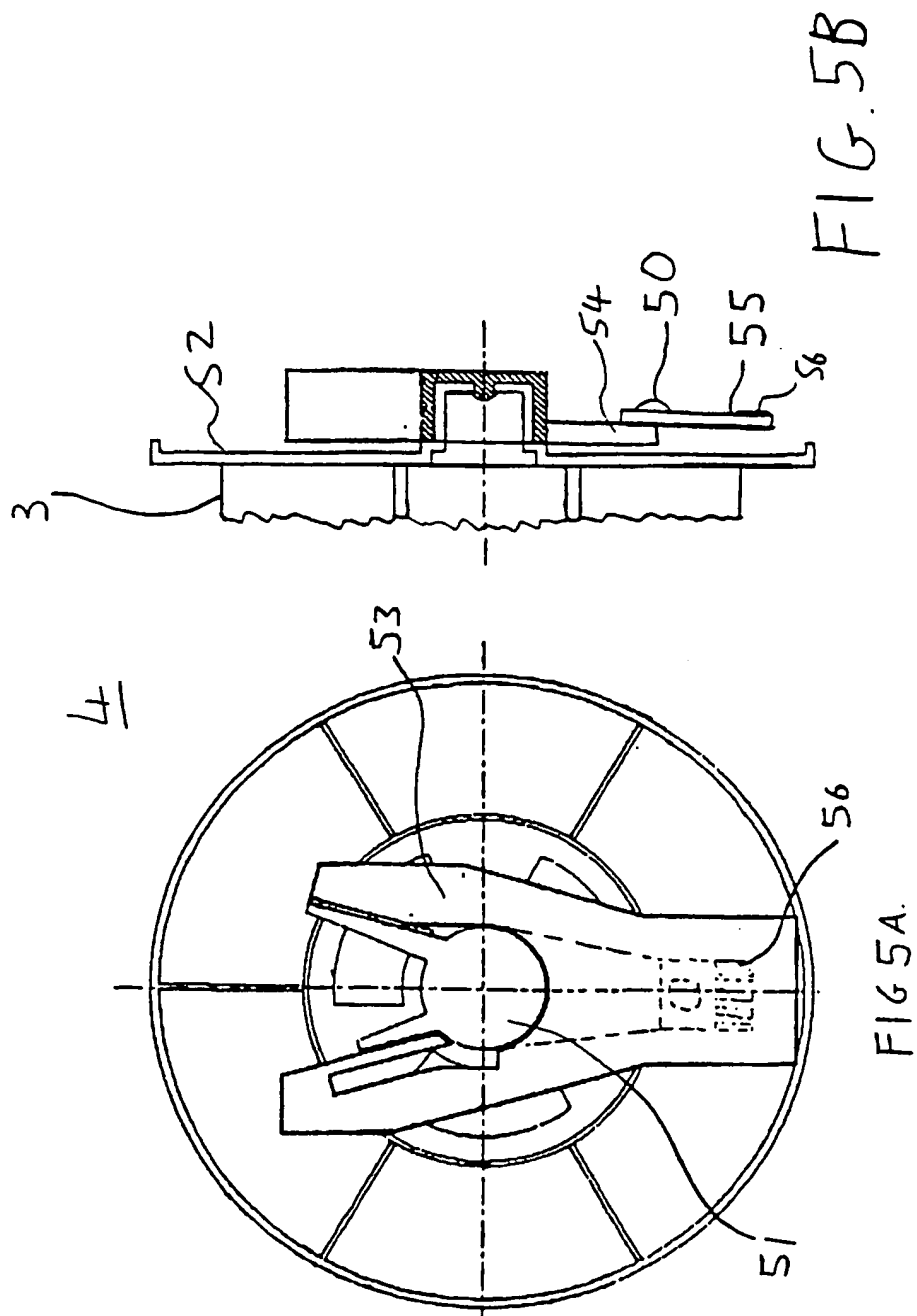
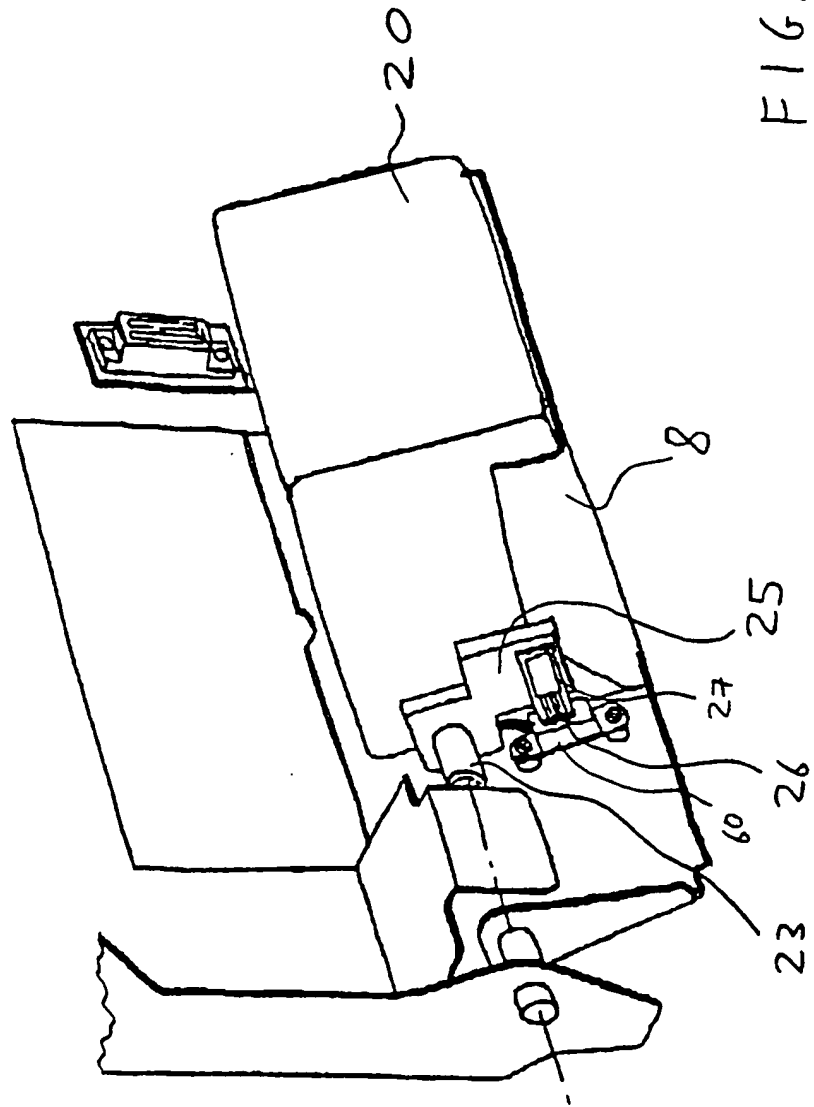


FIG. 4





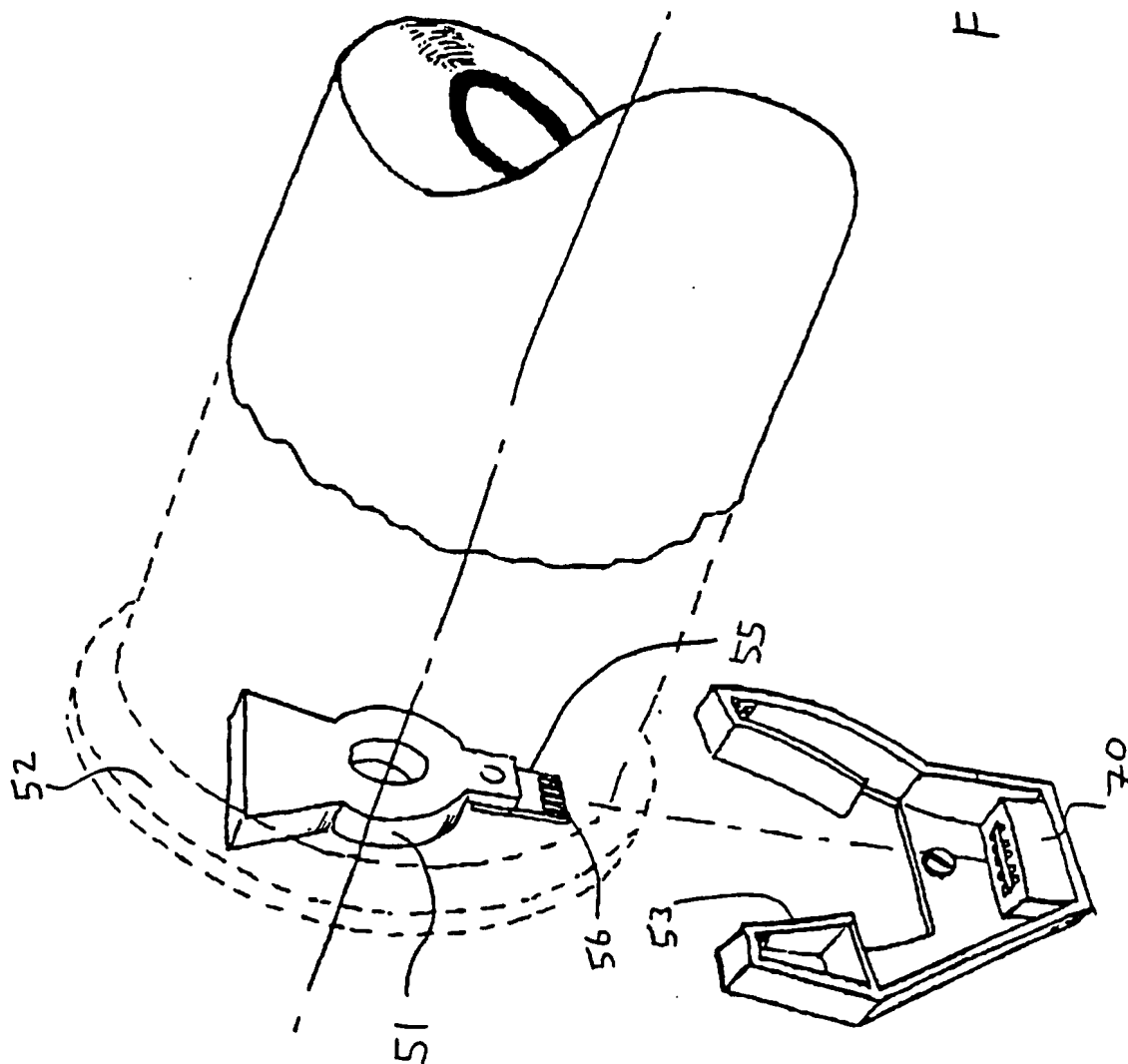


FIG. 7

INTERNATIONAL SEARCH REPORT

International Application No
PC1/GB 96/03025

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B41L13/06 B65H26/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B41L B65H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|-----------------------|
| A | EP 0 517 480 A (RISO KAGAKU CORP) 9 December 1992 see the whole document --- | 1-19 |
| A | PATENT ABSTRACTS OF JAPAN vol. 012, no. 419 (M-760), 8 November 1988 & JP 63 154567 A (CANON INC), 27 June 1988, see abstract --- | 1-19 |
| A | PATENT ABSTRACTS OF JAPAN vol. 009, no. 231 (M-414), 18 September 1985 & JP 60 087158 A (FUJI XEROX KK), 16 May 1985, see abstract --- | 1-19 |
| | -/-- | |

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *G* document member of the same patent family

Date of the actual completion of the international search

14 March 1997

Date of mailing of the international search report

26.03.97

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+ 31-70) 340-3016

Authorized officer

Madsen, P

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 96/03025

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|----------|---|-----------------------|
| A | PATENT ABSTRACTS OF JAPAN vol. 011, no. 330 (M-636), 28 October 1987 & JP 62 111861 A (CANON INC), 22 May 1987, see abstract --- | 1-19 |
| A | EP 0 640 492 A (RISO KAGAKU CORP) 1 March 1995 see the whole document --- | 1-19 |
| A | EP 0 613 785 A (RISO KAGAKU CORP) 7 September 1994 see the whole document ----- | 1-19 |

INTERNATIONAL SEARCH REPORT

Inter nal Application No

PCT/GB 96/03025

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---------------------|----------------------------|---------------------|
| EP 0517480 A | 09-12-92 | JP 4361040 A | 14-12-92 |
| | | JP 4361041 A | 14-12-92 |
| | | US 5224419 A | 06-07-93 |
| ----- | | | |
| EP 0640492 A | 01-03-95 | JP 7061107 A | 07-03-95 |
| | | US 5438921 A | 08-08-95 |
| ----- | | | |
| EP 0613785 A | 07-09-94 | JP 6247027 A | 06-09-94 |
| | | US 5537920 A | 23-07-96 |
| ----- | | | |

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.